



Fire Detection Systems



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Technology Base

Spectrex is a world technological leader in the development of:

- ❑ Automatic Explosion/Fire Detection & Suppression
- ❑ Optical Flame Detection (incl. UV/ IR IR3 – Triple IR)
- ❑ Optical Gas Detection (Open Path DOAS)
- ❑ Fire detection and extinguishing
- ❑ Novel Fire Extinguishing Technologies





SAFE System Highlights

- ❑ Superior performance, high quality, cost effective systems that are fast, sensitive, immune to false alarms and include BIT and discrimination features
- ❑ Highly effective and safe in operation with fast response to all the fire threats and highly immune to false activations
- ❑ Rapidly addresses all types of growing fires as early as possible (before they pose a risk of propellant ignition)
- ❑ Substantially improved detection performance by providing much greater detector coverage of the protected space and the special hazards areas
- ❑ Control box that includes all the extended capabilities to allow its use for all the additions and extensions that are required.
- ❑ Enhances the troops survivability and safety, capable to serve as drop in replacement to current systems (Form, Fit and Function)



Military Users Requirements

- ❑ Soldier Survivability
- ❑ Vehicle Survivability
- ❑ Safety





Soldier Survivability & Safety

- ❑ Fast detection of explosive type fuel fires that are formed by penetration of a HEAT round or from an IED.
- ❑ Fast detection of slow grow fires or small fires started as a secondary fire such as fuel on a hot surface that is ignited after an explosive event
- ❑ Fast detection of slow grow fires as a result of accidental fires such as battery arching, roadside accidents, overheating in the engine compartment that happen in both combat and peacetime environments
- ❑ In combat, all types of fuel fires must be rapidly addressed to provide conditions that will not result in premature troops egress from the vehicle. Premature egress can expose troops to enemy fire.
- ❑ Explosive fires must be suppressed fast and efficiently to prevent second degree skin burns and the formulation of high concentration of poisonous decomposition products.



Fire Detection Military Requirement

Sensitivity Threshold: the system shall be capable of detecting slow-growth fires or combat initiated explosions. The system shall provide automatic extinguisher activation when a sensor is exposed to a fuel oil (A-A-52557A or equivalent) **pan fire of 18 ± inches diameter at a distance of 5.0 ± 0.1 feet.** [reference - para. 3.3.9.1 of Purchase Description for W56HZV-07-R-0214].





FAASV Fire Detection

The FAASV is an ammunition (powder charges) carrier. Any ignition of fuel fire that cannot be detected in its early stages while it is still small and grow undetected to the 18" pan fire size as seen below and could result in propellant ignition and possibly detonation of stored ammunition.

*This is the size of fire in a FAASV 1: 1 outline
Do you think that it is a major safety threat?*





The current Stryker system in a fire test: **NO DETECTION** after 16 seconds





BAE Live Fire Baseline Tests

- ❑ Two trials were attempted with the original-equipment KIDDE BFV base line (OE) system.

In the original position, the center of the pan was approximately **5 feet** from the sensor, when moved, it was about **4 feet**.

- ❑ These three trials were aborted when the base line **OE system failed to trigger** at 31, 26, and 34 seconds after fire initiation.
- ❑ For the fourth trial, and all subsequent tests, the reservoir was elevated to the position approximately **3 feet** from the sensor. At that position, the **OE AFSS detected the fire 20.01 seconds** after its initiation, and then extinguished the fire in the next 0.50 seconds.



Fire Detection



The large size of the fuel fire front and cone of vision (angle) required by Stryker detector to detect a fire



Fire Detection by SAFE Detector



The Safe System detects smaller size of fuel fire



The size of detected flame as seen from the detector's position

- Spectrex detector detects at 48" distance



- Stryker detector detects at 12" distance





Pan Fuel Fire Detection



The Pan fire was not detected by the current Stryker system



The SAFE System detects and extinguishes the fire when it was still small



BAE Test Results - Conclusions

- ❑ The baseline **OE AFSS** with OE Halon 1301 extinguisher bottles **took 20.51** seconds to detect and **extinguish the fire**.
- ❑ The **Spectrex AFSS** with OE Halon 1301 bottles took **0.42 seconds**. The Spectrex AFSS with **FM-200** dual-shot bottles took 2.03 – 5.84 seconds, **average 3.80**.
- ❑ In compatibility tests, the Spectrex sensor and CE proved interchangeable with their OE counterparts, both separately and together. The systems were able to detect the fires and send out the triggering signal in all tested combinations.



BAE Test Results - Conclusions

- ❑ The **Spectrex AFSS fire sensor proved vastly superior to the OE unit** in fire detection time in this testing with a diesel fire of approximately 24" tall in a 12" x 12" reservoir in the crew compartment of the BFV.
- ❑ At the initial location of the fire, the **OE system failed to detect** the fire in approximately 30 seconds, and the trials were aborted.
- ❑ When the fire location was moved rearward, closer to the detector, the OE sensor was still **unable to detect the fire**.
- ❑ Finally, the fire location was elevated and the OE sensor was then able to detect it.
- ❑ The Spectrex sensor had detection times between 0.10 and 3.56 seconds, average 1.13.
- ❑ The OE BIT-enabled (The Stryker) sensor had detection times between 13.49 and 25.28 seconds, average 18.01. The OE non-BIT-enabled (BFV) sensor had detection times between 14.87 and 20.01 seconds, average 17.28.
- ❑ The Spectrex sensor was typically an order of magnitude faster at detecting these fires than the OE sensors. This performance was measured with one type and size of fire in the crew compartment.